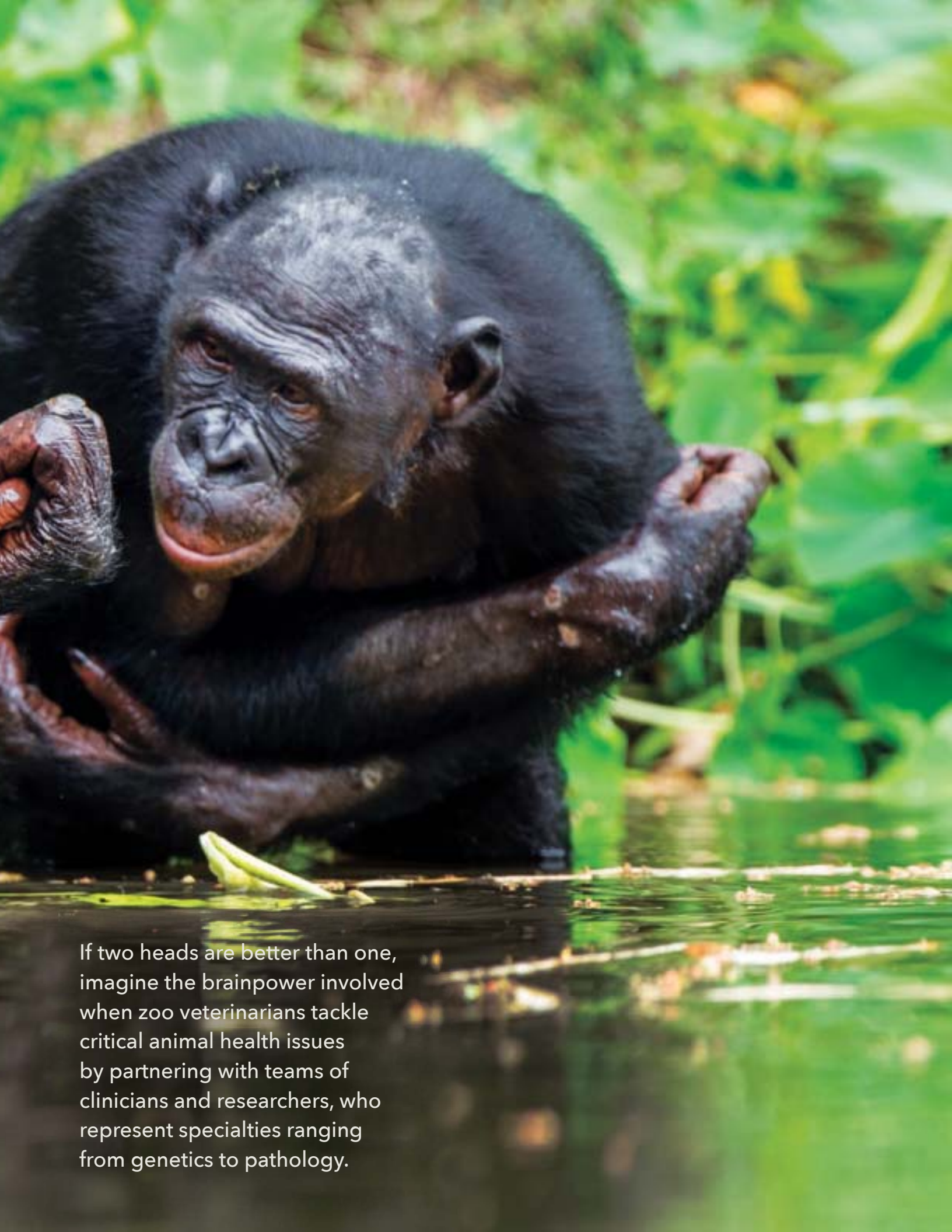




# pooling Resources

BY MARY ELLEN COLLINS

Collaboration is Key to Addressing Animal Health Issues



If two heads are better than one, imagine the brainpower involved when zoo veterinarians tackle critical animal health issues by partnering with teams of clinicians and researchers, who represent specialties ranging from genetics to pathology.



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“ Cardiovascular disease is a really major health issue with a captive population of great apes and we don't know what's causing it ... ”

Staff at Association of Zoos and Aquariums (AZA)-accredited facilities are making progress in the diagnosis and treatment of Elephant Endotheliotropic Herpesvirus (EEHV) and tuberculosis (TB) in elephants and cardiovascular disease in great apes by tapping into the expertise of medical experts, who likely never imagined having an animal as a patient. Despite an initial learning curve, collaborative efforts like the Great Ape Heart Project (GAHP) have proven very successful.

“We can learn a lot from each other, and I think this project has opened eyes all around,” said Dr. Hayley Murphy, director of veterinary services at Zoo Atlanta in Atlanta, Ga., and director of the GAHP. “I like the MDs to meet the apes first to learn their personalities and how unique they are. They

all volunteer their time, and I want them to make that connection and be inspired. I've never met anyone who walked away and said, 'I'm not going to help you.'”

Although the groups that deal with each disease have different challenges and strategies, they share a commitment to preserving endangered populations and dispelling misconceptions about the development and transmission of disease. Through research and advances in medical care, they are prolonging and saving the lives of more animals, while also creating a more educated public.

#### Great Ape Heart Project

“Cardiovascular disease is a really major health issue with a captive population of great apes, and we don't know what's causing it,” said Murphy. However, funding from the Institute of Museum and Library Services (IMLS) facilitated the creation of the GAHP, which has grown to a total of 70 institutions working together to improve diagnosis and treatment. The first grant funded a workshop at which 60 people from 30 institutions determined that their first priority was to create a database that would facilitate information-sharing and coordination of research among facilities that housed great apes. A second IMLS grant funded the building of the database.

“The beauty of this project is that we now have a database that allows us to gather and look at data across multiple institutions in a more systematic way, analyze what we know, identify trends and figure out what to do,” said Murphy.

She views the GAHP as a wagon wheel, with spokes represented by database mining, clinical care and wide-ranging research projects. For example, a third IMLS grant will support the work of Dr. Vickie Clyde, staff veterinarian, Milwaukee County Zoological Gardens in Milwaukee, Wis., who is continuing her research with bonobos and hypertension.



Funding from the Institute of Museum and Library Services facilitated the creation of the Great Ape Heart Project.



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caption caption caption

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“We know from the pilot testing that we can take finger blood pressure measurements from bonobos while they are awake; that the measurements change as the animals age; and that we can see a drop in blood pressure after starting antihypertensive medication,” Clyde said. “The goal of this project is to develop a reference range for normal finger blood pressure in awake bonobos and identify at what measurement blood pressure treatment should be considered.”

Murphy reports that the GAHP pathology team is currently rewriting protocols for postmortem study of animals with heart disease and will be seeking funding for digital scan histology that will enable pathologists across the country to study the same slide simultaneously.

Although there is still much to learn, Murphy said, “It amazes me how far we’ve come. We have an international organization now with a full-time employee, a database and a dedicated team of volunteer MDs and veterinarian cardiologists, who review all of our

echocardiograms. We’ve gone from finding out about heart disease because an ape had died from it to being able to diagnose it pre-mortem, treat it and improve the quality of life for the ape.”

### Elephants and TB

TB has emerged as a disease that affects Asian elephants, but diagnostic challenges have made it very difficult to develop treatment protocols.

“The disease is not new, but the scientific inquiry is still very new,” said Dr. Kay Backues, director of animal health and senior staff veterinarian, Tulsa Zoo in Tulsa, Okla. “You can’t X-ray an elephant’s chest like you can with a human. There’s still a lot of work to be done.” Backues is a member of the Stakeholders Task Force on Management and Research Priorities of Tuberculosis for Elephants in Human Care, a group comprised of veterinarians, elephant managers, physicians and public health officials, who have created a set of recommendations ([www.aazv.org/?page=ElephantMTBRecs](http://www.aazv.org/?page=ElephantMTBRecs)) regarding

diagnosis and treatment that is based on current knowledge and ongoing research.

Dr. Michele Miller, South African Research Chair in Animal Tuberculosis at Stellenbosch University and member of the stakeholders group, has started an animal research group within a division in which 140 researchers are working on different aspects of human TB.

“Most of the physicians I’ve met didn’t realize that elephants got TB, and they find it incredibly fascinating,” she said. “The head of our division, Prof. Paul van Helden, is a leading TB researcher, and he’s helping to direct our animal research. This allows us to take advantage of the expertise and cutting-edge science that exists in human TB research.”

Miller, who is currently studying elephant immune responses in order to develop new methods of diagnosing the illness, added, “Often, you can’t tell an animal is infected unless you find bacteria, which is extremely difficult. There are some very preliminary results that suggest we can use immune response-based blood tests. If the body is responding as if there are bacteria there, we can extrapolate that the animal is infected.”

The recommendations created by the stakeholders serve not only as guide to diagnosis and treatment of TB but also help to dispel unfounded fears like the misperception that zoo visitors are at risk in the vicinity of an infected animal. The disease is transmitted by prolonged, close contact with a person or animal that is shedding the organism.

As the research reveals new information, the recommendations will change to reflect that.

“The disease appears to be manageable, and we have found that the sooner you treat it, the better off the animal will be,” said Backues. “On some things, the jury is still out and we need time to let the science move forward and reveal itself...but in the meantime, while this is a serious disease with proper safeguards, there’s no need to panic.”

### **Elephants and EEHV**

EEHV can cause a fatal hemorrhagic disease and is found in both managed and wild populations of Asian elephants.

Dr. Lauren Howard, associate veterinarian, Houston Zoo, Inc., in Houston, Texas, was the primary investigator on a \$459,000 three-year IMLS



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grant to fund the Zoo's EEHV research program in partnership with Baylor College of Medicine, Johns Hopkins University and the National Elephant Herpesvirus Laboratory at the Smithsonian National Zoological Park in Washington, DC. Prior to this collaboration, zoo staff might have been aware that elephants were ill with the virus, but they lacked the knowledge and resources to treat them effectively.

Baylor serves as the primary research lab, the Smithsonian's National Zoo is the primary diagnostic lab and the Houston Zoo provides blood samples for research and handles education and outreach.

"We run workshops to educate fellow veterinarians about EEHV," said Howard. "In February 2015, we had a workshop for 90 people from 9 countries, during which people shared scientific papers. It's a really great way to share information."

Being located in close proximity to Baylor is a particular benefit with regard to research. "When we collect blood, we just walk the samples over to Baylor in an Igloo cooler," said Howard. "Our knowledge base has increased exponentially since we got involved with them...because zoo vets are the ultimate generalists and at Baylor we are working with herpes virologist, Dr. Paul Ling"

Researchers have not yet been able to grow the virus in the lab, which means they cannot develop a vaccine. Although Howard and others hope that will happen eventually,

in the meantime, they have achieved some success with early detection and treatment with famciclovir and fluids.

"Our approach has evolved tremendously," said Howard. "Dr. Ling has developed a new, very sensitive polymerase chain reaction (PCR) test that lets us detect the virus before symptoms occur, so we're able to treat the elephants very early. We test our elephants once a week...[and although] we don't always treat very low viral levels, we watch the elephants very closely and may retest them daily or several times a week. If the level starts to increase, or if their white blood cell counts begin to change, we start treatment even if the elephant is not acting ill. We've taken Baylor's research and put theory into practice...and with our herd it's working." Since they started the new PCR monitoring, they have not had any fatalities; and two young elephants that twice developed EEHV levels in their blood survived, thanks to the frequent monitoring and early intervention.

Scientific breakthroughs don't happen every day, but the discoveries that have already emerged from these multi-institutional groups bode well for a future in which collaborating with colleagues who serve human patients may well be the most valuable tool in serving and preserving the animals.

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Mary Ellen Collins is a writer based in St. Petersburg, Fla.



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